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The distribution of the
Cape Province *Dytiscidae*
and speculations as to their
possible origins ✕

The Dytiscidae are a family of carnivorous aquatic Coleoptera found in rivers, streams and ponds. Some prefer running water, others still, but none are rigidly restricted to one or the other. That they go back a long way in time may be inferred from the fact that many of their genera are world wide in distribution. That they have existed in Africa for a long period seems probable since, with the exception of the genera endemic to the Cape Province, all but four genera, and at least forty species, are known to occur also in Madagascar.

It is true that the Dytiscidae can fly but there is no evidence that they can cross deserts or any wide stretch of sea. The indications, in fact, are all to the contrary. Apart from one *Cybister* taken from a puddle on the east coast of England in 1829 there are no records of even casual invasions of Dytiscidae from the continent. *Hyphydrus ovatus* Linn. common in the south of France has not been able to reach either Corsica or the opposite Mediterranean coast. *Hyphydrus aethiopicus* B-B., common and widely distributed in Africa south of the Sahara, has not appeared in Madagascar and there are many other examples which could be cited. The Dytiscidae do not normally ascend to great heights in their flight and it seems probable, since they often dive on to glass roofs, that they find water by sight. If, then, they found themselves over the sea it seems likely that they would descend and their long survival be improbable. The correspondence between the Dytiscid fauna of Africa and Madagascar seems too great to be accounted for by chance, and leads to the conclusion that either a connection between that island and the continent persisted for a longer time than is now considered possible, or that some of the species have persisted for a longer period of time than seems reasonable.

As little beyond the general outlines of the biology of the African Dytiscidae is known, the problem has been approached from the geographical point of view. An attempt has been made to ascertain the distribution of the species within the Cape Province and, by comparison with their distribution in Africa and beyond, to make tentative suggestions as to their origin. Since there have been so few specialist collectors and the taxonomy of the group is difficult, the picture must be incomplete and not necessarily accurate.

The Dytiscid fauna of the Cape Province, as at present known to me, consists of 117 species divided into 31 genera. Of these genera 12 are world wide, 4 are only found in the Old World, 3 are now predominantly Holarctic, 4 are known only from Africa and Madagascar and 8 are endemic to South Africa. Of the 117 species, 63 are endemic to southern Africa, (which is taken here to include South West Africa, Bechuanaland, Southern Rhodesia,

Southern Mozambique, Swaziland and Basutoland) and of these 63, 44 are known only from the Cape Province.

For purposes of analysis the fauna was divided into:—

- I. A basic Cape fauna comprising those species which are common everywhere.
- II. Species also widely distributed but occurring less frequently in collections.
- III. Species only recorded from the Eastern Cape.
- IV. Species recorded only from the Western Cape.

The division between the two sides of the Cape Province was taken arbitrarily as a line running from the Storms River mouth north to the Orange River. Species occurring frequently on the western side with only a few records a short way to the east of the boundary are considered as Western Province endemics and *vice versa*.

I. The basic Cape fauna

This comprises 14 species belonging to 10 genera. Only one genus (*Tyndalhydrus*) is endemic to South Africa and it is monospecific. The remaining genera are widespread in Africa and outside it. Of the 14 species, none of which occur also in Madagascar, 9 have a limited distribution outside South Africa and, as far as my experience goes, the density of their populations falls quickly and progressively to the northern parts of their range. These species perhaps originated in South Africa. The remaining five species have a wide distribution in Africa and are probably tropical in origin.

II. Rarer species

To this group 25 species belonging to 16 genera have been attributed. Of the genera, one (*Sharphydrus*) is endemic to the Cape Province, two (*Africophilus* and *Canthyporus*) occur only in Africa and Madagascar, three (*Potamonectes*, *Agabus* and *Rantus*) are now predominantly Holarctic, seven are world wide in the tropical and temperate zones and three occur in the Old World only.

Of the 25 species, 11 are endemic to Southern Africa. One, *Africophilus jansei* O-C. is reported from Swaziland, Basutoland, the north of the Eastern Province and Uniondale in the Western Province: Two, *Rantus peringueyi* Rég. and *Potamonectes vagrans* O-C., are endemic to South Africa: Seven, *Potamonectes capensis* O-C., *Sharphydrus coriaceus* Rég., *Canthyporus hottentotus* Gem. and Har., *Canthyporus petulans* Guign., *Canthyporus testaceus* Zimm., *Rantus cicurus* Fab. (all with a western bias in the Cape) and *Yola inopinata* O-C., are endemic to the Cape Province. The remaining species are tropical, most of them aethiopic, but *Hydaticus exclamatoris* Boh. and *Eretes sticticus* Linn., the latter world wide in the tropics and sub-tropics, reach West Africa north of the equator and Madagascar.

III. Species recorded from the Eastern Province only

In this group are 51 species belonging to 19 genera of which only one, *Tikoloshanes* may be endemic to South Africa. (Since the only species of this genus stands in some collections under *Eretes*, its distribution may be wider than is at present known). Of the 51 species no less than 12 appear to be endemic to the Eastern Cape and 10 more are recorded only from southern Africa. With the exception of the *Canthyporus* spp. (to be discussed later) all the endemics belong to wide-spread genera, have a more or less restricted and continuous distribution and have probably arisen *in situ* from their relatives. Apart from *Africophilus nesiotis*, Guign., the remaining species are invaders from the tropics: 15 of them reach West Africa north of the equator and seven are also present in Madagascar. The majority of these species, whether they occur in West Africa, Madagascar or not, appear only on the coastal strip or, if they have spread inland, are not found south of the approximate latitude of East London.

It would seem that some barrier is operating to hinder their spread, perhaps temperature or the scarcity of permanent water.

The genus *Africophilus* is a specialized member of the tribe *Laccophilini* whose main genus, *Laccophilus*, is world wide in distribution. The species of *Africophilus* have a specialized habitat, that of mud and gravel beside mountain streams or in trickles over rock faces where algae afford cover and foothold. They have, further, a discontinuous distribution: one is known from the Ivory Coast, one is endemic to the Cape Province, one is endemic to Madagascar and *A. nesiotis* is known both from the mountains of the north-eastern Cape and Madagascar. This suggests that it has inhabited the region for a longer time than need be postulated for the other species, tropical or autochthones.

IV. Species confined to the Western Province

The western Cape fauna is exceedingly interesting. Of its 27 species, 25 are endemic. (*Canthyporus exilis* Boh. was originally recorded from Cafraria and *Coelhydrus brevicollis* Shp. from Port Elizabeth but neither have since been taken from their type localities). The 25 species belong to 12 genera of which six are endemic to the Western Cape. Five of these are monospecific and belong to the tribe *Hyphydrini* whilst the sixth, *Sharphydrus* has two species, one confined to the Berg River system, and one whose range extends into the eastern side of the Western Province. The fauna is dominated by species of the genus *Canthyporus* and 14 of these are endemic. The remaining endemics belong to genera with a wide distribution in Africa and outside it.

The particular problems presented here are numerous. *Bidessus mundulus* O.-C., (in press), *Herophydrus obscurus* Shp., and *Copelatus platynotus* Rég. may well have been derived from other species of their genera present in the fauna. This may also be true of *Laccophilus immundus* Shp. and *Herophydrus capensis* Shp. but both are very distinct species, neither belonging to any of the species complexes present in their genera. Why do both appear to be confined to a very small area around Cape Town? The genus *Canthyporus* has a very discontinuous distribution, one species in South West Africa, one in the Belgian Congo, one in Tanganyika, one in Madagascar, one in Swaziland, one in Basutoland, and 21 in the Cape Province of which three are endemic to the eastern Cape and 14 to the western Cape. This distribution possibly indicates an ancient genus which may have arisen in south central Africa at a time when the climate was more temperate; was driven out by increasing desiccation and rising temperature, leaving species in the north now confined to the mountains, and has undergone intensive speciation in the Cape where the present temperature range and abundant permanent waters provide ideal conditions for it.

The five species of the Hyphydrini genera, *Andex insignis*, *Hydropeplus trimaculatus*, *Darwinhydrus solidus*, *Coelhydrus brevicollis*, *Primospes suturalis*, with the exception of *Andex insignis* which has not to my knowledge been taken since it was first recorded, are very common in the South Western Cape and a few specimens of each have been taken as far west as Witte-elsbosch in the Humansdorp district. They are different in appearance from each other and from the main genus, *Hyphydrus*, which has many species in the Old World. They are usually regarded as relicts from a very ancient fauna, a view supported by the fact that there are related genera in South America where *Hyphydrus* does not occur, which have, however, undergone speciation, and one in tropical Africa with three species, one in West Africa and the Belgian Congo, one in the Southern Sudan and one in Madagascar. *Andex insignis* shares with *Tyndalhydrus curaboides* an unusual feature which may be primitive, that of the failure of the prosternal process to meet the metasternal process. It is difficult to understand why all of these genera are each only represented by one species.

Finally there remains the question of the Holarctic genera present. These are represented by *Agabus raffrayi*, *Rantus capensis* and two endemic *Rantus* spp. together with *Potamonectes*

capensis and *Potamonectes vagrans*. The Holarctic elements in the Cape fauna are usually regarded as recent immigrants from the north. Of *Agabus raffrayi* this is no doubt true. There are *Agabus* spp. in Abyssinia and records of this species from Abyssinia to the Cape. This genus is not represented in Madagascar. The genus *Rantus* has, however, several species in Madagascar and is also present in South America and Australia. *R. capensis* also has records from Abyssinia to the Cape. The two endemic species are closely related to it. There are more species of *Rantus* in Central Africa than of *Agabus* and fewer in Abyssinia. Is it not more probable that *Rantus*, rather than being of Holarctic origin, has been in Africa as long as the majority of the genera and, if we accept a Gondwanaland origin for those with a world wide distribution, should we not bracket it with them?

The origin and present distribution of the two species of *Potamonectes* is extremely puzzling. The genus is now predominantly Holarctic. A few species reach Central America, there are several in the Southern Sudan, Abyssinia and Eritrea but none in Africa between those and these in the Cape. There are none in Madagascar nor in Australia. That they are related to the European and North American *Potamonectes* seems certain since *P. capensis* possesses two preapical denticles on the elytra as do members of one group of the northern species. *P. capensis* is common in the Western Cape but extends a little to the east of its boundary; *P. vagrans* occurs in the south of the Transvaal, the Orange Free State, and the Eastern Cape, its range overlapping in the centre with that of *P. capensis*. Both *Potamonectes* spp., *Sharphydrus coriaceus* and *Tyndalhydrus caraboides* live in rivers and dams, often the same ones where their ranges overlap. If they are ancient inhabitants why should *P. capensis* and *S. coriaceus* be almost restricted to the western Cape, *P. vagrans* to the eastern whilst *T. caraboides* has conquered the whole Province? That the spread of a species may be slow is likely, since, besides the hazards of rivers in spate and dams drying up, the larval mortality, especially in the younger stages, must, because of the carnivorous habit of both larvae and adults amongst which they live, be great. One would have supposed however that the time available to them has been ample for at least a coincidence of their ranges.

Species attributed to each group. Southern African endemics are marked ***, South African endemics **, and Cape Province endemics *.

I. *Laccophilus cyclopis* Shp., *Laccophilus lineatus* Aubé, *Hyphydrus aethiopicus* B-B., *Herophydrus oscillator* Shp., *Guignotus infirmus* Boh., *Guignotus lineolatus* Boh., *Clypeodytes meridionalis* Rég., ***Yola subopaca* Rég., ***Tyndalhydrus caraboides* Shp., *Copelatus erichsoni* Guer. var. *marginalis* Gschw., ****Copelatus capensis* Shp., *Hydaticus galla* Guer., *Hydaticus servillianus* Aubé., *Rantus capensis* Aubé.

II. *Hydrocoptus aethiopicus* B-B., *Laccophilus pellucidus* Shp., *Laccophilus congener* O-C., *Laccophilus concisus* Guign., ****Africophilus jansei* O-C., *Hydrovatus macrocerus* Rég., **Sharphydrus coriaceus* Rég., **Yola inopinata* O-C., **Bidessus* n.sp., *Bidessus sharpi* Rég., *Guignotus bivirgatus* Guign., **Potamonectes capensis* O-C., ***Potamonectes vagrans* O-C., *Herophydrus inquinatus* Boh., **Canthyporus petulans* Guign., **Canthyporus hottentotus* Gem. and Har., **Canthyporus testaceus* Zimm., *Agabus raffrayi* Shp., **Rantus cicurus* Fab., ***Rantus peringueyi* Rég., *Hydaticus exclamatoris* Aubé, *Hydaticus capicola* Aubé, *Hydaticus caffer* Boh., *Eretes sticticus* Linn., *Cybister tripunctatus* Ol. subsp. *africanus* Cast.

III. *Hydrocanthus micans* Shp., *Hydrocanthus constrictus* Rég., *Canthyporus sedilloti* Rég., *Canthyporus notula* Er., *Laccophilus contiro* Guign., *Laccophilus adpersus* Boh., **Laccophilus* n.sp., *Philacollus lineatoguttatus* Rég., *Africophilus neslotes* Guign., *Hyphydrus cycloides* Rég., **Hyphydrus komghaensis* O-C., *Meihles cribratellus* Fairm., **Potamonectes* n.sp.,

Uvarus vitticollis Boh., *Uvarus baoulicus* Guign., *Uvarus peringueyi* Rég., *Guignotus geminodes* Rég., *Guignotus transvaalenis* Rég., *Bidessus ovoides* Rég., *Bidessus fraudator* O.-C., *Clypeodytes evanescens* Boh., ****Clypeodytes hieroglyphicus* Rég., **Clypeodytes ignobilis* O.-C., *Yola elegantula* Boh., ****Yola simulantis* O.-C., ***Yola swierstrai* Gschw., *Yola frontalis* Rég. subsp. *capensis* O.-C., *Yola tuberculata* Rég., ****Hydrovatus nefandus* O.-C., *Hydrovatus glomeratus* Guign., ****Hydrovatus amplicornis* Rég., ****Hydrovatus validicornis* Rég., **Hydrovatus browni* O.-C., ****Hydrovatus gravicornis* O.-C., *Hydrovatus pescheti* O.-C., ****Canthyporus swaziensis* O.-C., **Canthyporus cooperae* Guign., **Canthyporus fluviatilis* O.-C., **Canthyporus guignoti* O.-C., *Copelatus edax* Guign., *Copelatus sylvaticus* Guign., *Copelatus pulchellus* Klug., **Copelatus* n.sp., **Copelatus* n.sp., **Copelatus* n.sp., *Hydaticus bivittatus* Cast., *Hydaticus dregei* Aubé, *Hydaticus flavolineatus* Boh., *Hydaticus dorsiger* Aubé, *Tikoloshanes eretiformis* O.-C., *Aethionectes apicalis* Boh.

IV. *Laccophilus immundus* Shp., *Herophydrus capensis* Rég., *Herophydrus obscurus* Shp., **Bidessus* n.sp., *Bidessus imitator* O.-C., **Sharphydrus capensis* O.-C., *Hydrovatus galpini* O.-C., **Canthyporus lateralis* Boh., **Canthyporus luridipennis* Rég., **Canthyporus exilis* Boh., **Canthyporus parvus* O.-C., **Canthyporus laccophiloides* O.-C., **Canthyporus bicinctus* Rég., **Canthyporus navigator* Guign., **Canthyporus canthydroides* O.-C., together with six undescribed species of *Canthyporus*; **Andex insignis* Shp., **Hydropeplus trimaculatus* Cast., **Darwinhydrus solidus* Shp., **Coelhydrus brevicollis* Shp., **Primospes suturalis* Shp., **Copelatus platynotus* Rég.

SUMMARY

The picture yielded by this analysis appears to be one of the Cape Province inhabited by a small group of species which probably originated there in comparatively recent times. This supplemented by species from the tropics, some of which, since they occur also in Madagascar, are probably older in origin than others, together with endemics which have arisen from them. Mixed with these are a few species, occurring chiefly in the western Cape which may be representatives of a still older fauna. These are: **Andex insignis* Shp., *Hydropeplus trimaculatus* Cast., *Coelhydrus brevicollis* Shp., *Darwinhydrus solidus* Shp., *Primospes suturalis* Shp., and possibly *Tindalhydrus caruboides* Shp., *Sharphydrus coriaceus* Rég., *Sharphydrus capensis* O.-C., *Potamonectes capensis* O.-C. and *Potamonectes vagrans* O.-C., the two latter being representatives of a now predominantly Holarctic genus.

The presence of practically all of the genera and so many of the species in both Africa and Madagascar indicates (unless we accept, against the evidence of present day happenings, a considerable immigration and emigration between them) an astonishing fixity of species for very long periods of time or a Madagascar more easily available to colonisation at a much later time than is now usually accepted.

DISCUSSION

- Dr. Stuckenberg*: It has been suggested that Madagascar was last connected with Africa during the mid-Jurassic. If this is so, its Dytiscid fauna must surely have flown to the island.
- Dr. Omer-Cooper*: The beetles could possibly be older. One authority has suggested that they go back to the Permian.
- Dr. Stuckenberg*: An interesting feature is the occurrence of *Africophilus nesiotus* on Madagascar and the Drakensberg. More usually the affinities of the Madagascan fauna are with the central African mountains.